Short Message Processing

The IS-41-C short message processing functions encompass the processes that enable, restrict, supplement, or otherwise impact an SME's ability to originate and terminate a short message.

Figure 13.7 illustrates a basic message origination and termination sequence for message transfer between two MS-based SMEs; SME-A is the originator, and SME-B is the destination. The key SMS elements that apply to the scenario shown in Fig. 13.7 are:

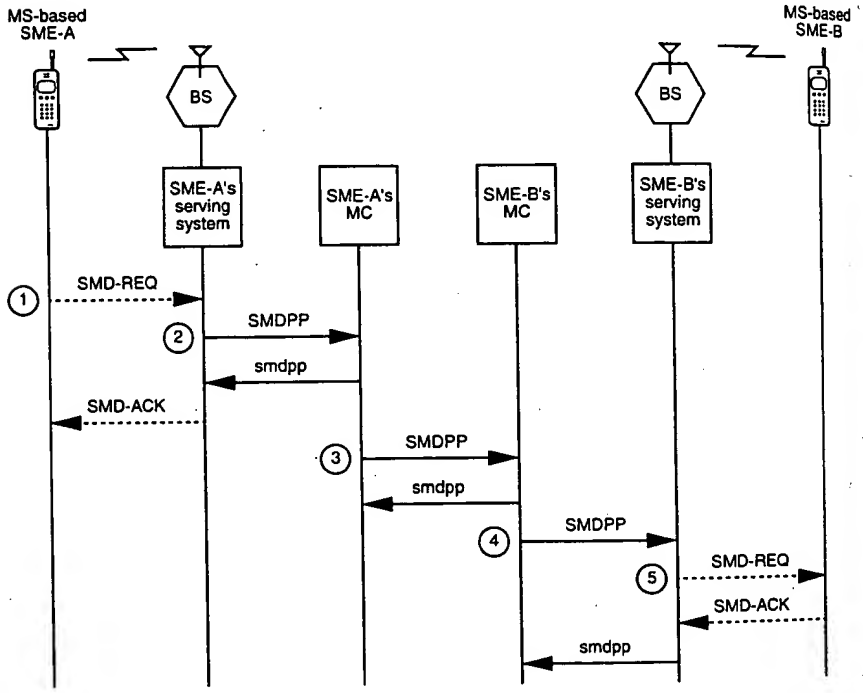


Figure 13.7 A basic message origination and termination sequence for short message transfer between two MS-based SMEs: (*1*) MS-based SME-A sends an air interface message, SMD-REQUEST (SMD-REQ), to the serving system. (*2*) The serving system routes the short message to SME-A's MC, using the IS-41-C SMSDeliveryPointToPoint Invoke (**SMDPP**) message. Each of the **SMDPP** messages shown in this scenario may be routed by using the same SS7 signaling network as is used for routing other IS-41-C messages; alternatively, a separate network, based on TCP/IP or some other network protocol, may be employed. When the acknowledgment (i.e., the **smdpp** message) is received from the MC, the serving system converts it to an air interface acknowledgment, the SMD-ACK message. (*3*) SME-A's MC may apply an originating supplementary service to the short message (this is not currently defined in IS-41-C); the **SMDPP** message is then routed to the destination SME's MC. (*4*) SME-B's MC may apply a terminating supplementary service to the short message (this is not currently defined in IS-41-C); the **SMDPP** message is then routed to the destination SME's serving system. (*5*) The serving system forwards the short message to the destination SME by using the air interface SMD-REQ message. SME-B responds with an automatic acknowledgment (SMD-ACK) to signal acceptance of the SMD-REQ message.

- Short message addressing and routing
- Short message barring, i.e., enforcing messaging restrictions
- Applying SMS supplementary services

Short message addressing and routing

Because of the store-and-forward nature of the short message transfer process, messages may take a circuitous path from the originator to the final destination. The addressing mechanisms defined in IS-41-C provide for this.

Refer to Fig. 13.7. IS-41-C allows the originating SME (SME-A) to provide up to four pieces of address information in the air interface (e.g., TDMA or CDMA) equivalent of the SMD-REQ message:

1. OriginalOriginatingAddress
2. OriginalDestinationAddress
3. OriginalOriginatingSubaddress
4. OriginalDestinationSubaddress

In general, the OriginalOriginatingAddress information is required for message termination but is not necessarily included for message origination; likewise, the OriginalDestinationAddress information is required for message origination but is not necessarily included for message termination.

IS-41-C defines six SMS address parameters for the SMSDeliveryPointToPoint Invoke (**SMDPP**) message:

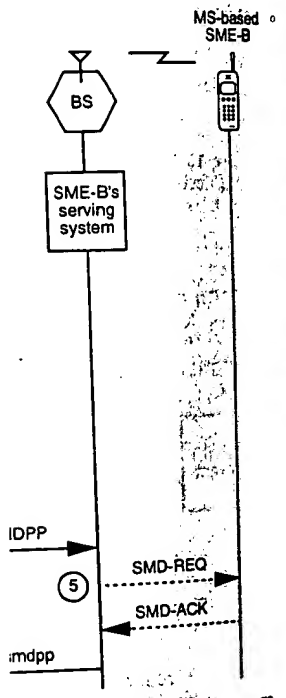
1. SMS_OriginalOriginatingAddress
2. SMS_OriginalOriginatingSubaddress
3. SMS_OriginatingAddress
4. SMS_OriginalDestinationAddress
5. SMS_OriginalDestinationSubaddress
6. SMS_DestinationAddress

The air interface OriginalOriginatingSubaddress and OriginalDestinationSubaddress information is optional and, if provided, is passed transparently from end to end by the SMS point-to-point bearer service in the SMS_OriginalOriginatingSubaddress and SMS_OriginalDestinationSubaddress parameters, respectively.

Various numbering formats are supported for the other SMS address parameters, including:

ITU-T E.164 format

ions encompass the
otherwise impact an
message.
ıtion and termination
-based SMEs; SME-A
n. The key SMS ele-
3.7 are:



ı sequence for short message
-A sends an air interface mes-
(2) The serving system routes
SDeliveryPointToPoint Invoke
ı in this scenario may be rout-
or routing other IS-41-C mes-
or some other network proto-
e **smdpp** message) is received
nterface acknowledgment, the
ating supplementary service to
.1-C); the **SMDPP** message is
MC may apply a terminating
currently defined in IS-41-C;
SME's serving system. (5) The
ination SME by using the air
ın automatic acknowledgment
ge.

- ITU-T X.121 format
- Private numbering plan formats
- Internet protocol (IP) address format

A probable scenario is for each MS-based SME in Fig. 13.7 to be addressed by its host MS's MIN, MIN-A (for SME-A) and MIN-B (for SME-B); the MIN-based addresses are encoded by using the E.164 format. Table 13.1 summarizes the relationship between the air interface address values in the SMD-REQ messages and the IS-41-C SMS address values in the **SMDPP** messages for each step identified in Fig. 13.7. For the purposes of illustration, we assume that all possible address parameters—with the exception of the subaddress parameters—are included in each message.

Most of the mappings between the air interface and IS-41-C address elements are straightforward:

- The air interface OriginalOriginatingAddress parameter maps to the IS-41-C SMS_OriginalOriginatingAddress parameter.
- The air interface OriginalDestinationAddress parameter maps to the IS-41-C SMS_OriginalDestinationAddress parameter.

However, the values of the SMS_OriginatingAddress and SMS_DestinationAddress parameters vary depending on the particular information flow in Fig. 13.7 and are set to ensure correct routing of the message:

- In step 2, the SMS_DestinationAddress parameter is set to MIN-A, rather than to MIN-B, to route the **SMDPP** message to SME-A's MC.
- In step 3, the SMS_OriginatingAddress parameter is set to MIN-A, to identify the source of the message as SME-A's MC; the

TABLE 13.1 Relationship between Air Interface and IS-41-C SMS Address Information

Step	Original Originating Address	Original Destination Address	SMS_Original Originating Address	SMS_ Originating Address	SMS_Original Destination Address	SMS_ Destination Address
1	MIN-A	MIN-B				
2			MIN-A	MIN-A	MIN-B	MIN-A
3			MIN-A	MIN-A	MIN-B	MIN-B
4			MIN-A	MIN-B	MIN-B	MIN-B
5	MIN-A	MIN-B				

SMS_DestinationAddress parameter is set to MIN-B, to route the **SMDPP** message to SME-B's MC.

- In step 4, the SMS_OriginatingAddress parameter is set to MIN-B, rather than to MIN-A, to identify the source of the message as SME-B's MC.

To route the message to SME-A's MC in step 2, the serving system can maintain a table of MIN-to-MC addresses (e.g., MIN to SS7 destination point code), as is often done today in IS-41 networks for routing IS-41 messages to an MS's HLR. If messages are transported by using an SS7 signaling network, the serving system can use the SS7 global title translation (GTT) capability. In this case, the serving system creates a global title address containing the SMS_DestinationAddress parameter value and requests a MIN-to-MC global title translation.

These same routing possibilities exist for SME-A's MC in step 3; i.e., to route the message to SME-B's MC, either a fixed MIN-to-MC address table or GTT on MIN-B may be employed, although the latter approach is much more likely (i.e., it is far easier to maintain the MIN-to-MC routing information in the SS7 network than in each and every accessible MC).

Terminating short messages to MS-based SMEs. Steps 2 and 3 in Fig. 13.7 involve message routing between fixed points. In step 4, the destination SME (SME-B) is mobile; therefore, if it does not already have one, SME-B's MC must get a valid routing address for the system currently serving SME-B. IS-41-C provides the SMSRequest operation specifically for this purpose; this routing requirement also impacts the RegistrationNotification operation, as explained below (see Fig. 13.8):

1. When a new SMS-capable MS is detected, the serving system sends a RegistrationNotification Invoke (**REGNOT**) message to the HLR. If the serving system is SMS-capable, the message includes the SMS_Address parameter that is used to route short messages to the serving system for delivery to the MS-based SME. For example, if the short-message transport network is SS7-based, the SMS_Address parameter may contain an SS7 point code and subsystem number; when the serving system receives an **SMDPP** message addressed to this point code and subsystem number, it assumes the message is intended for a visiting MS-based SME. The specific destination MS is identified by the address parameters within the **SMDPP** message.
2. When the MC requires a current routing address for an MS-based SME, it sends an SMSRequest Invoke (**SMSREQ**) message to the MS's HLR.
3. The HLR then makes a decision: Is the SMS_Address received in step 1 sufficiently current for SMS delivery purposes, or should the